Hudson River: PCB Fate and Transport Modeling

June 9, 2010

Model Is Needed to Understand Various Aspects of the Dredging Project

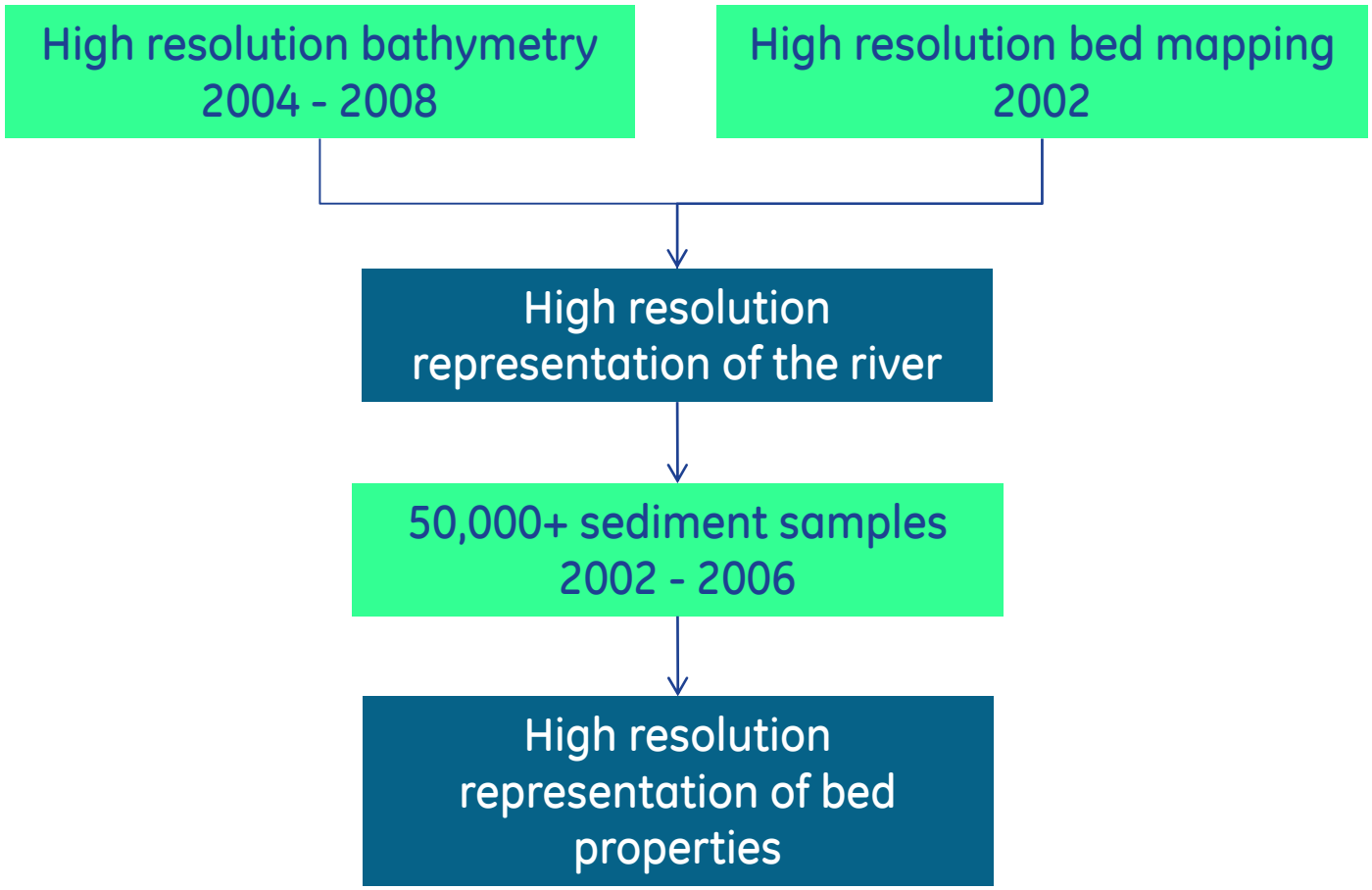
- Only means of integrating our knowledge of hydrodynamics, sediment transport, PCB fate and PCB bioaccumulation
- Takes account of state-of-the-science understanding
- Takes account of all the site-specific data
- EPA's standard practice at complex contaminated sediment sites
- Provides means to:
  - Determine load standards that preserve remedy benefits
  - Evaluate scenarios and impacts of uncertainty on predictions

Updated Model Now Available

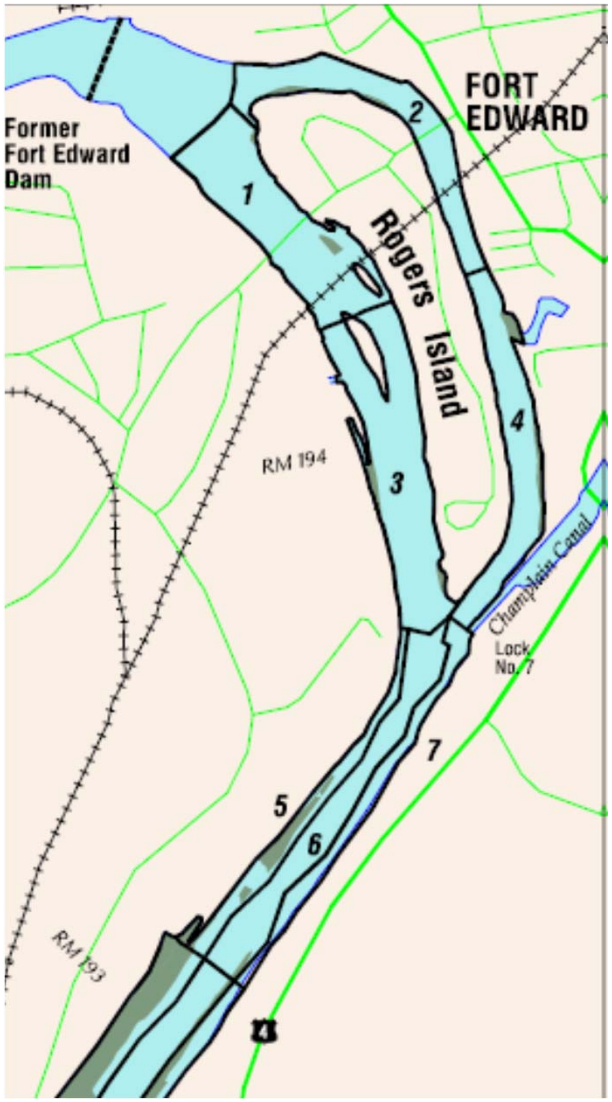
- EPA used PCB fate model to set the PCB load standard; model last updated 12 years ago
- Existing EPA model is out of date and under predicts PCB load to lower river
- Since last update: more river data and better computational capabilities:
  - Decade of weekly PCB water measurements
  - Decade of annual PCB fish measurements
  - 50,000 PCB sediment samples
  - Better bed mapping and bathymetry data
  - Greatly improved model spatial resolution to allow more realistic remedy simulation
- Most comprehensive data set to support modeling of any contaminated sediment site

Anchor QEA updated and recalibrated the PCB fate and transport model.

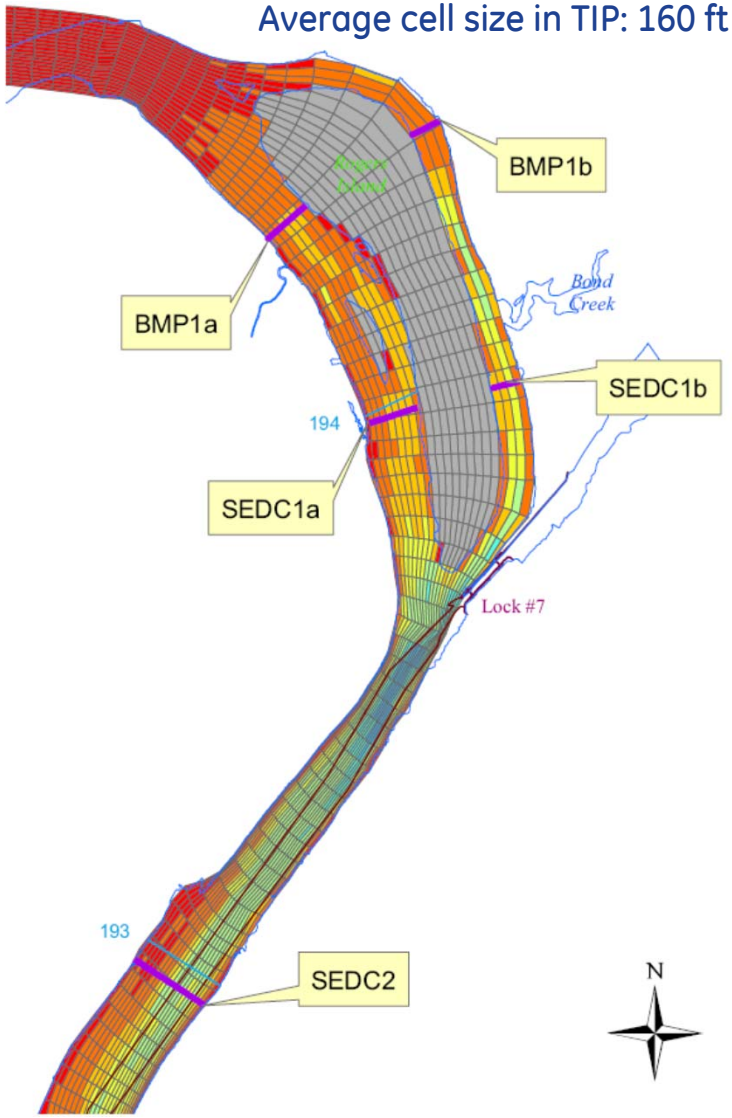
Advances in Modeling PCBs in the Upper Hudson River



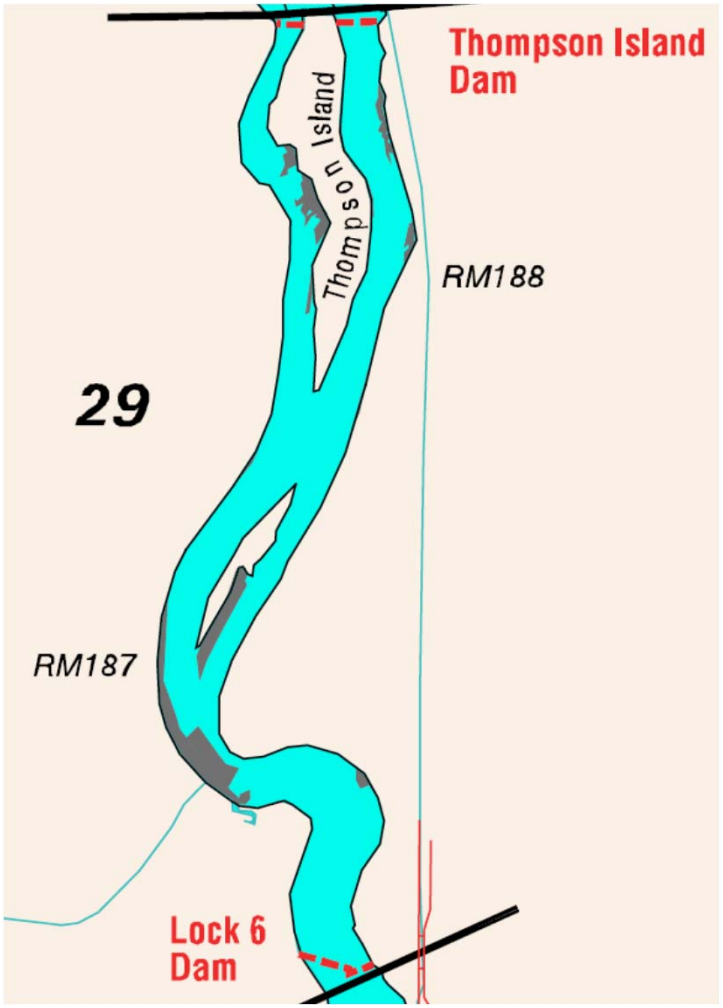
EPA and GE Thompson Island Pool Model Grids

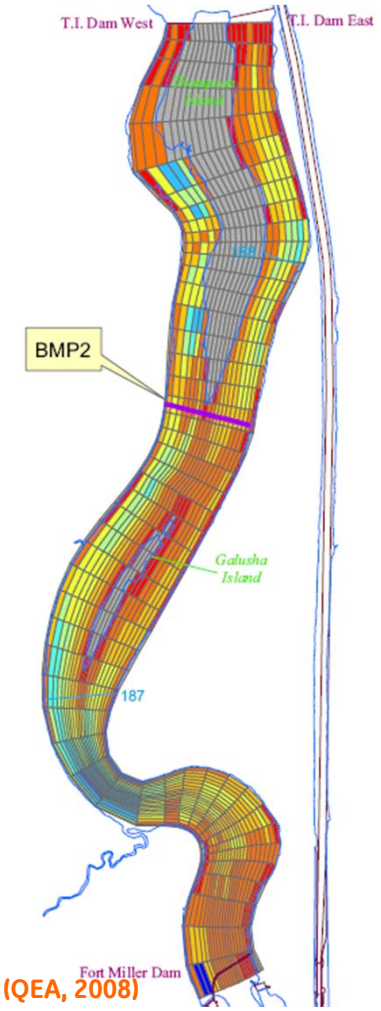


22 cells across channel
Average cell size in TIP: 160 ft x 30 ft

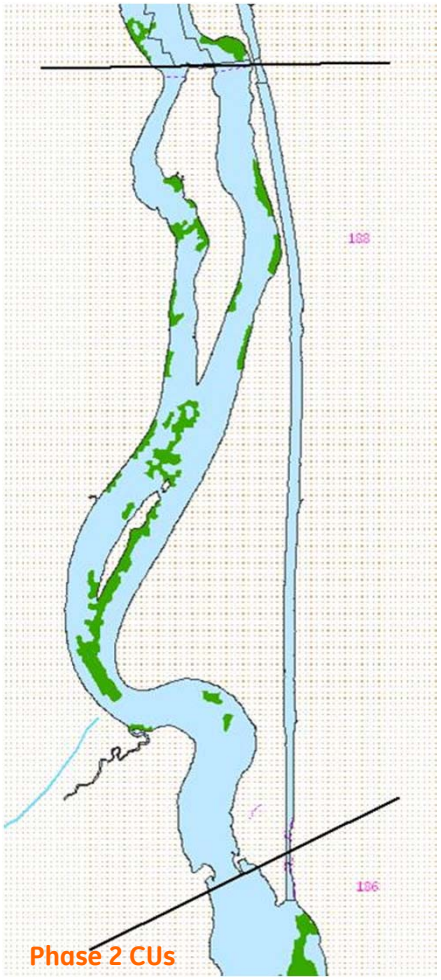


EPA and GE Reach 7 Model Grids



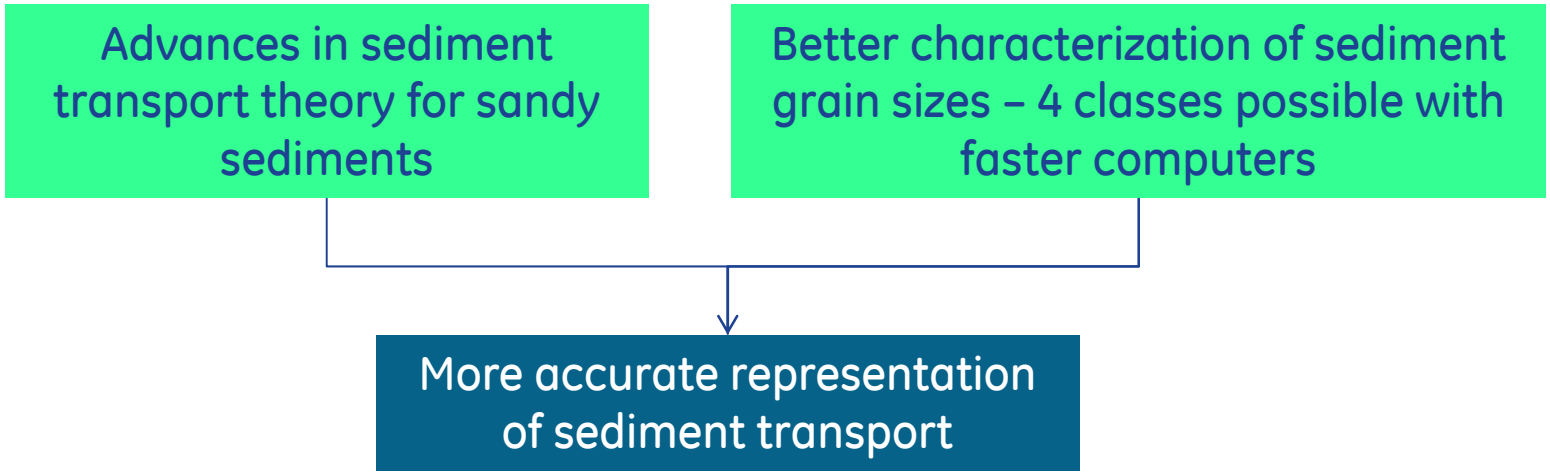


(QEA, 2008)

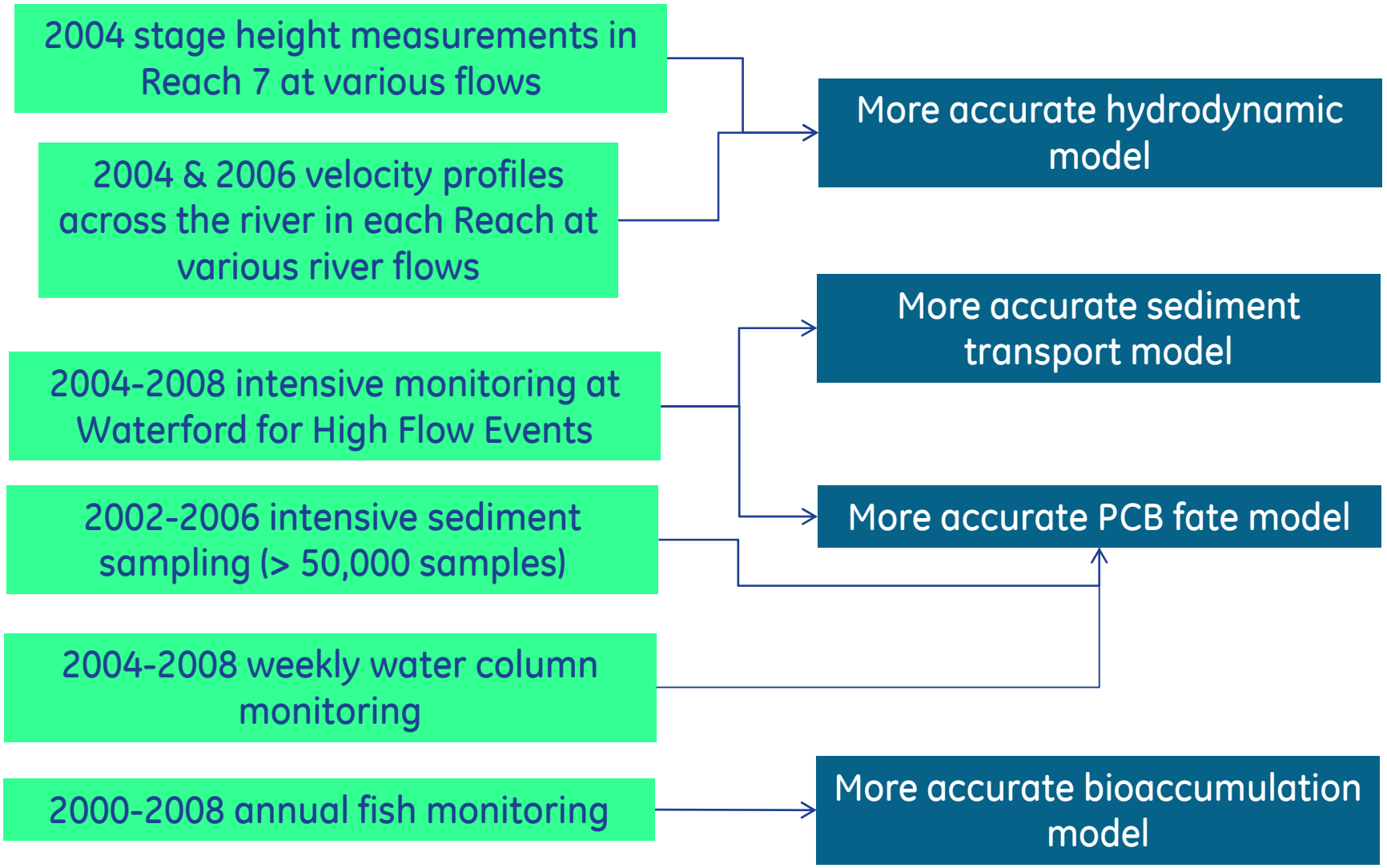


Phase 2 CUs

Advances in Modeling PCBs in the Upper Hudson River



More Comprehensive Site-Specific Data to Calibrate Model Parameters

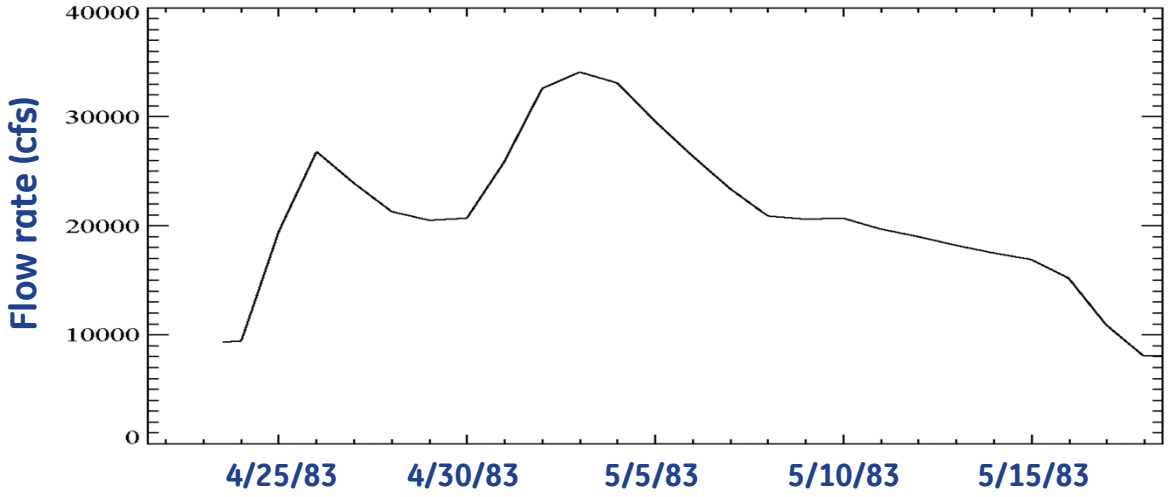


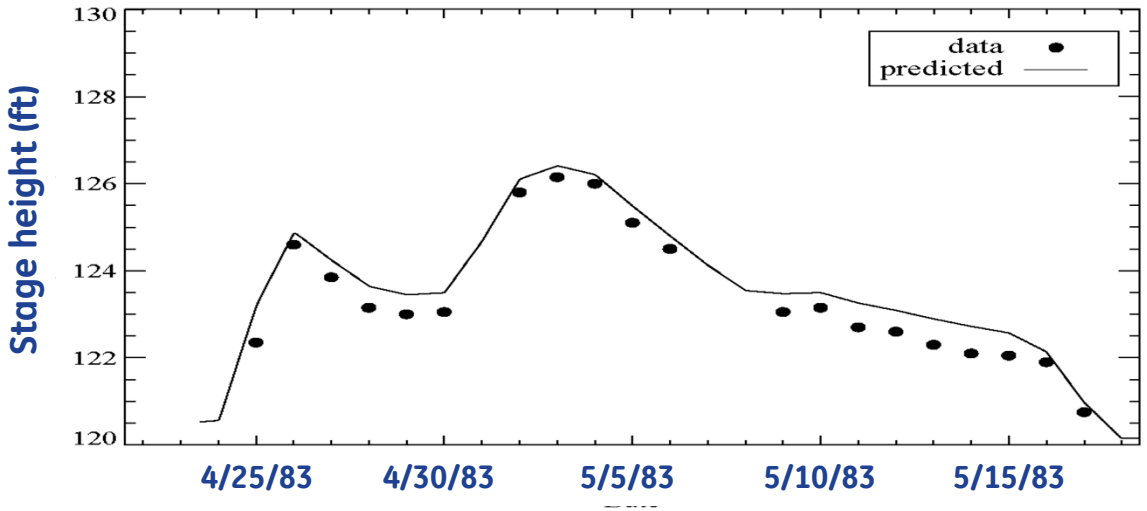
Benefits of Anchor QEA Model

- Development completed – ready for thorough EPA review and can be used now
- Has resolution needed to simulate the dredging program
- Accurately replicates long-term and short-term trends in sediment and PCB fate and PCB bioaccumulation
- Accurately predicts the PCB levels experienced during Phase 1 dredging

Hydrodynamic Model – Calibration

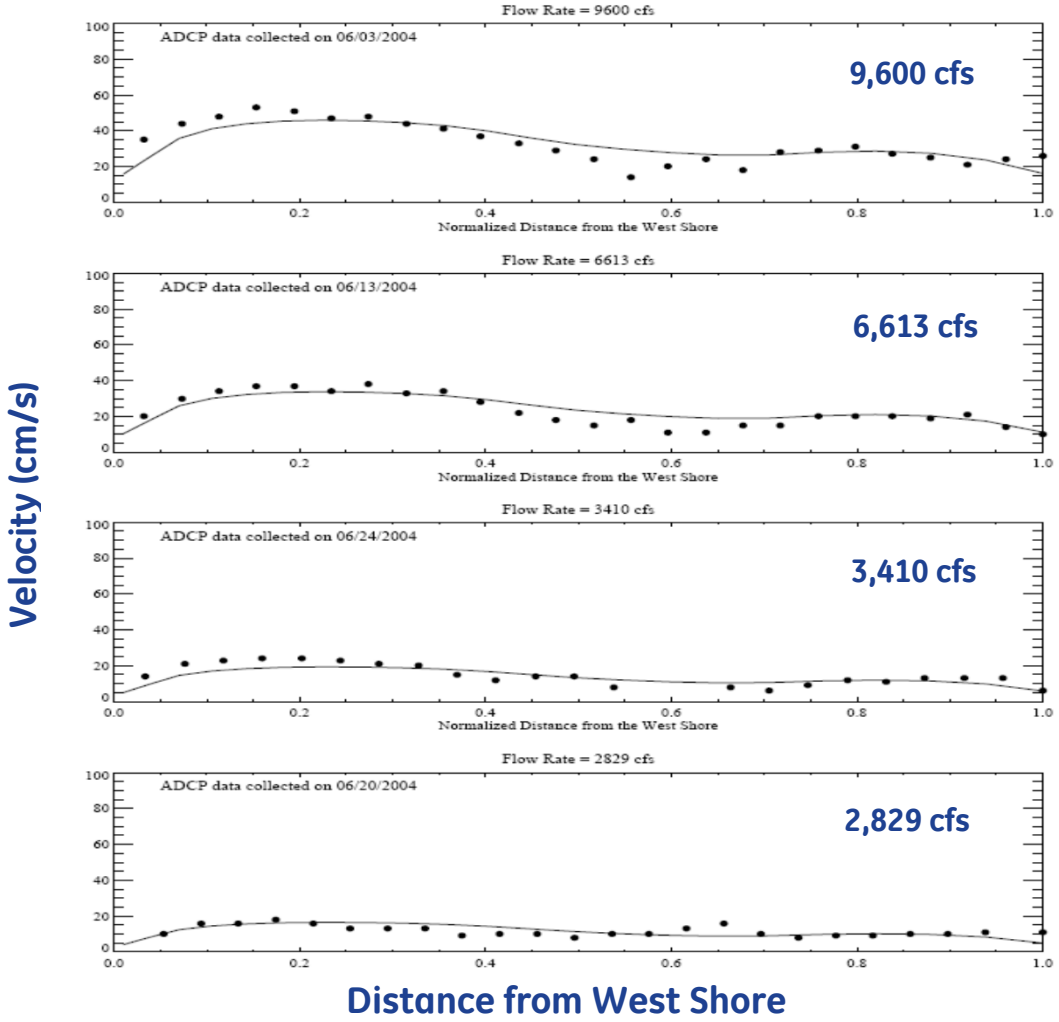
Stage height comparisons – 1983 Spring flood, TIP, Lock #7



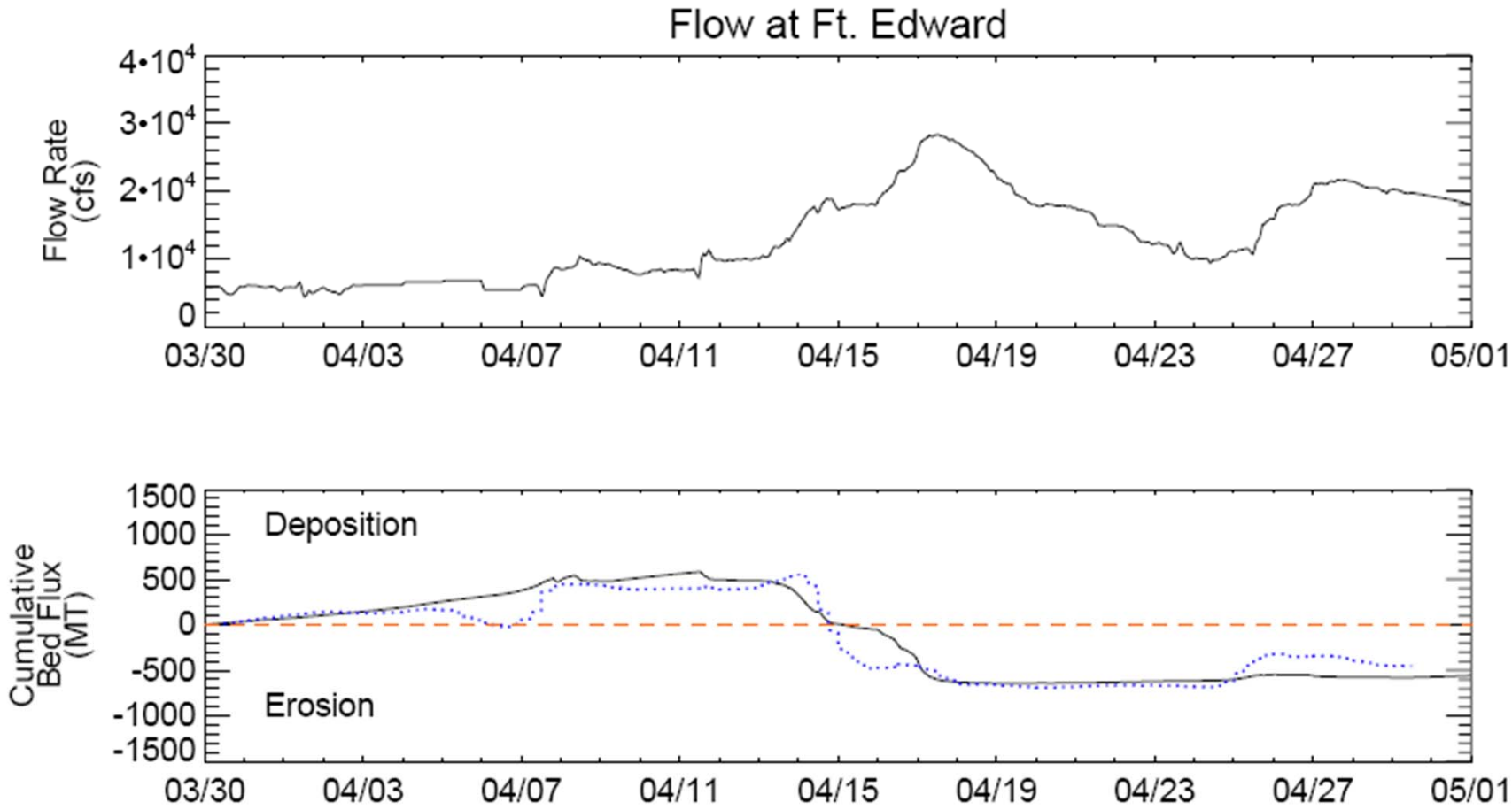


Hydrodynamic Model - Validation

Velocity comparisons - June 2004 survey: SEDC5, RM 190 (by Griffin Island)

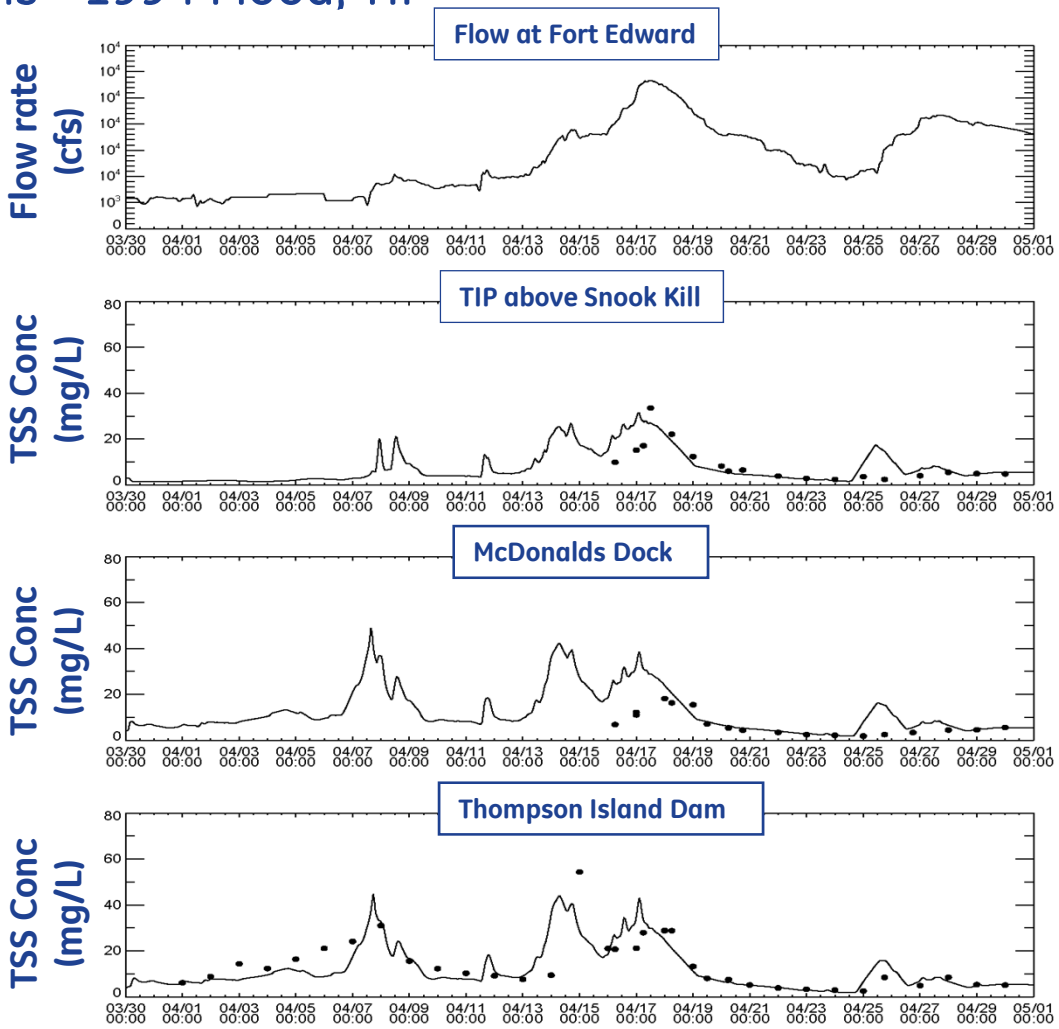


Model Matches Data: Sediment Transport 1994 Flood – Thompson Island



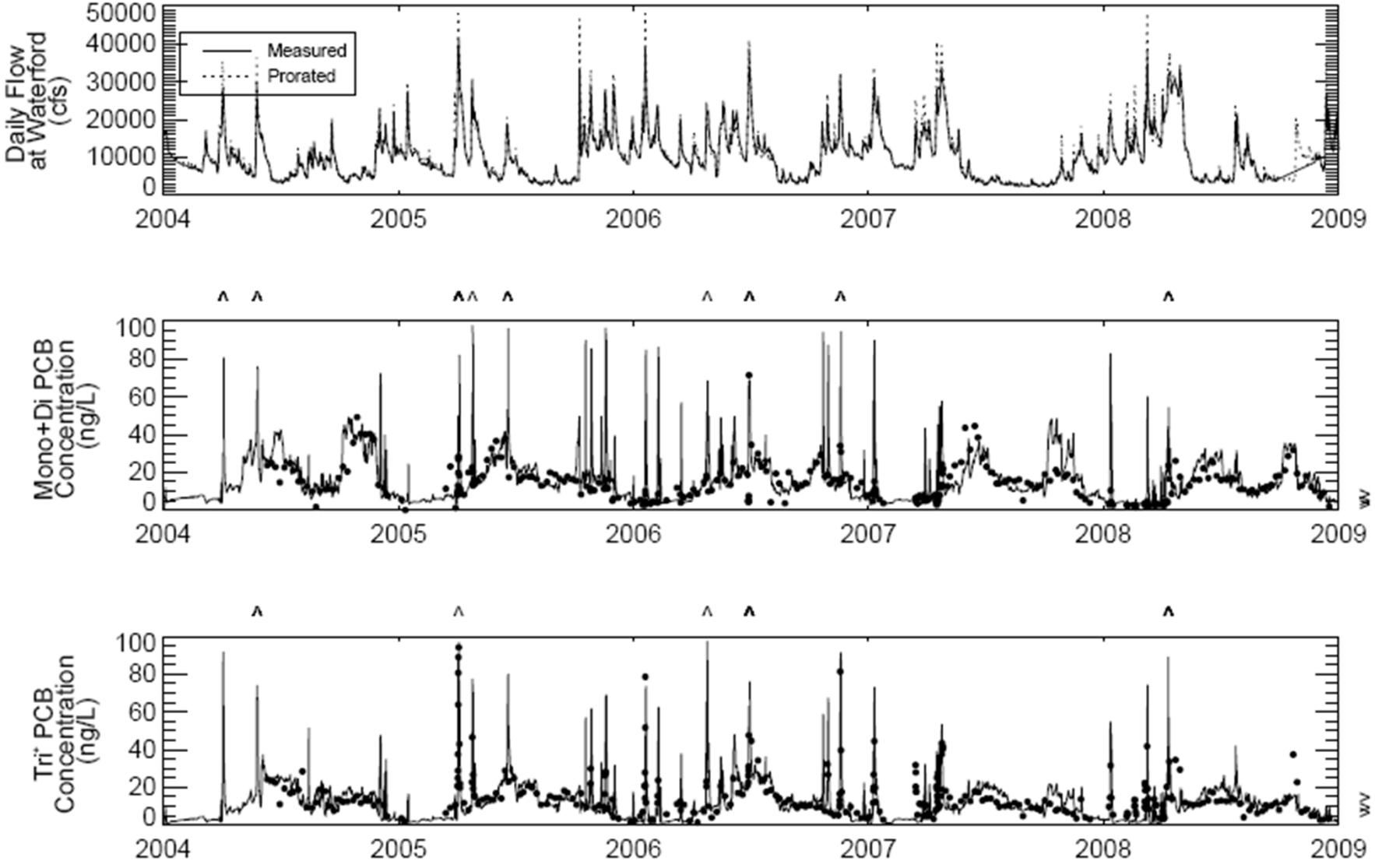
Sediment Transport - Calibration

TSS comparisons - 1994 Flood, TIP

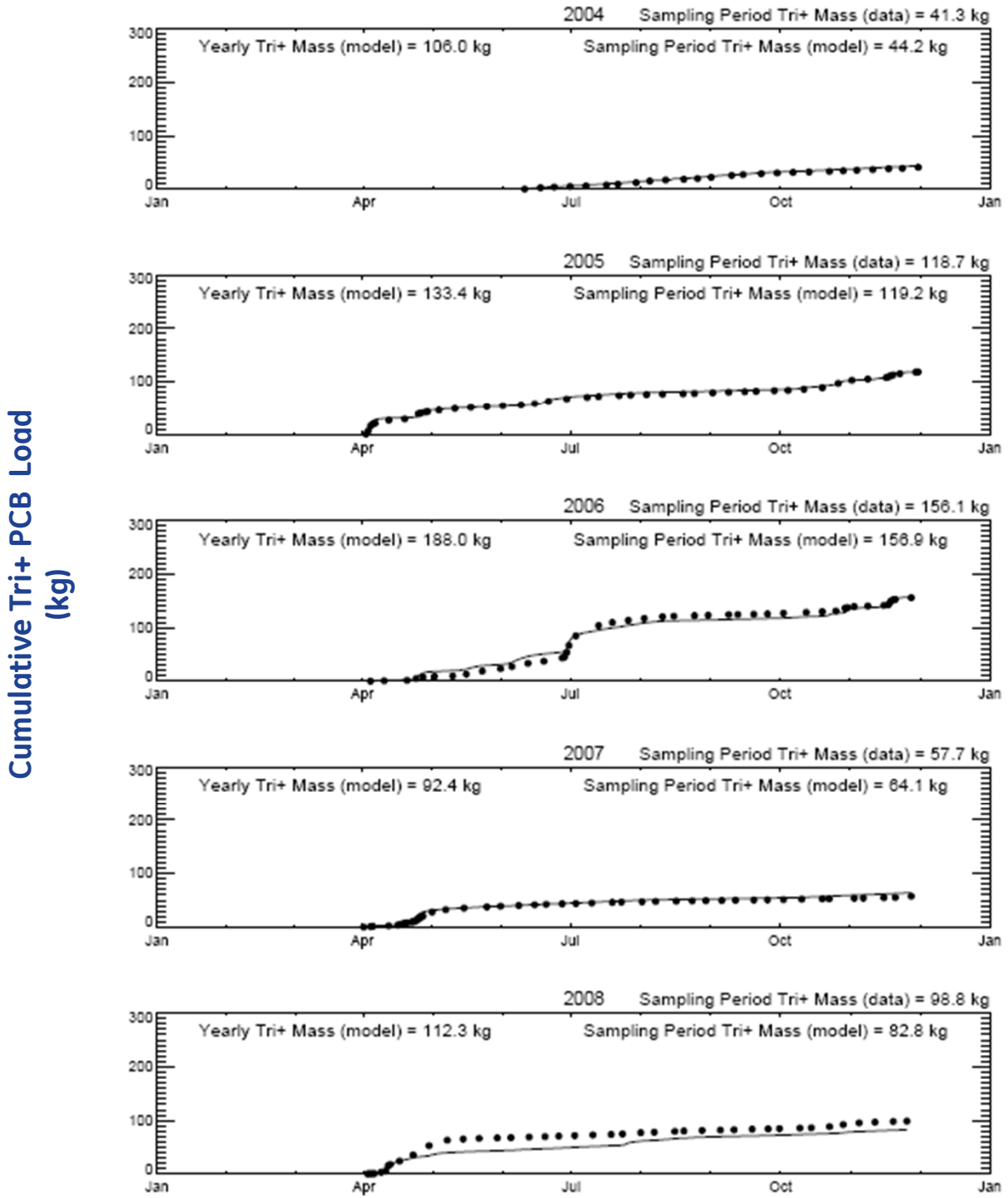


March 30 - April 29, 1994

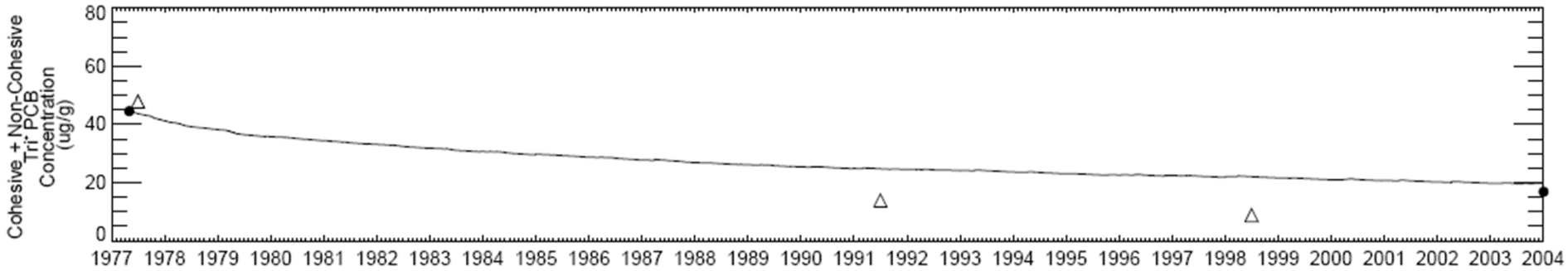
Model Matches Data: Water Column PCB – Waterford

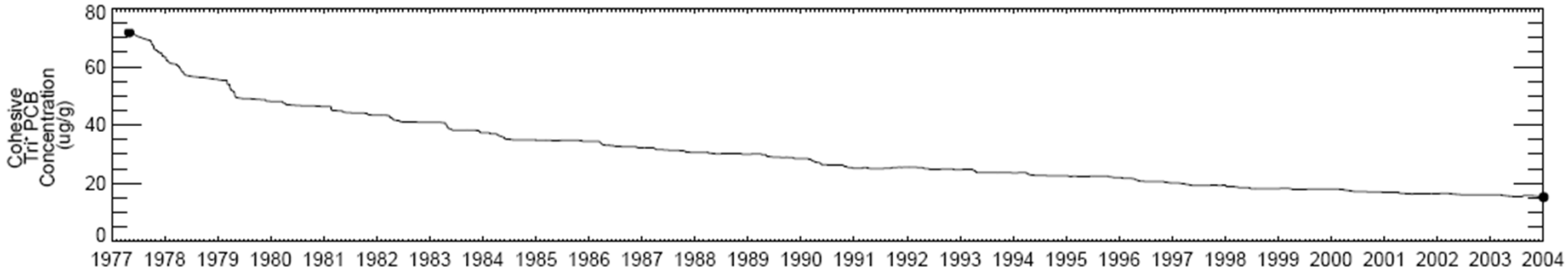


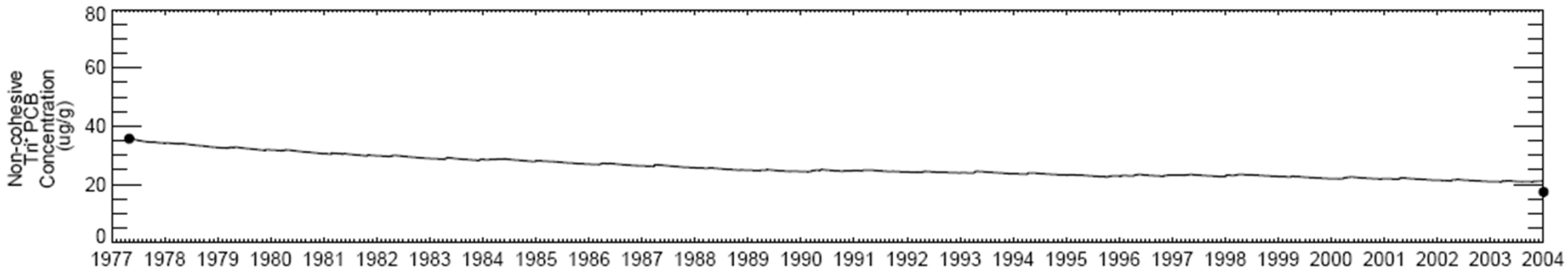
Model Matches Data: Cumulative Tri+ Load at Waterford



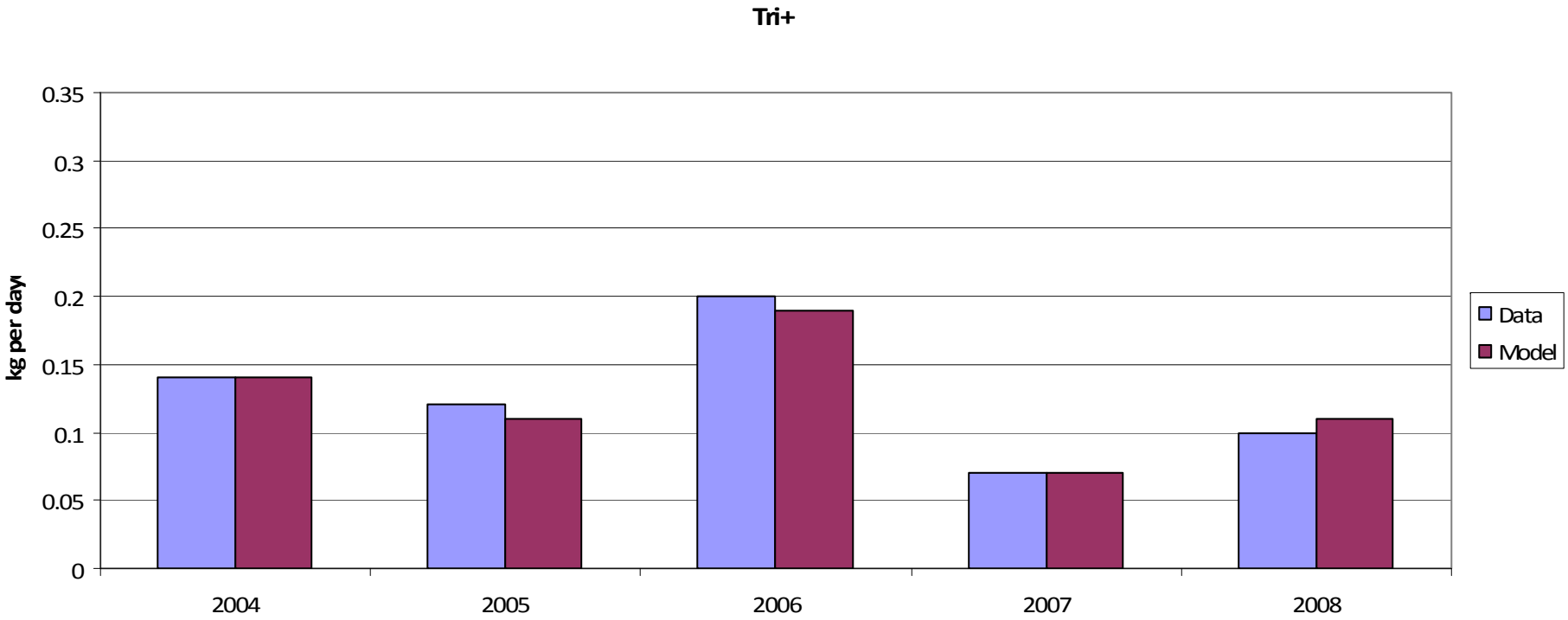
PCB Fate – Validation, TIP-wide



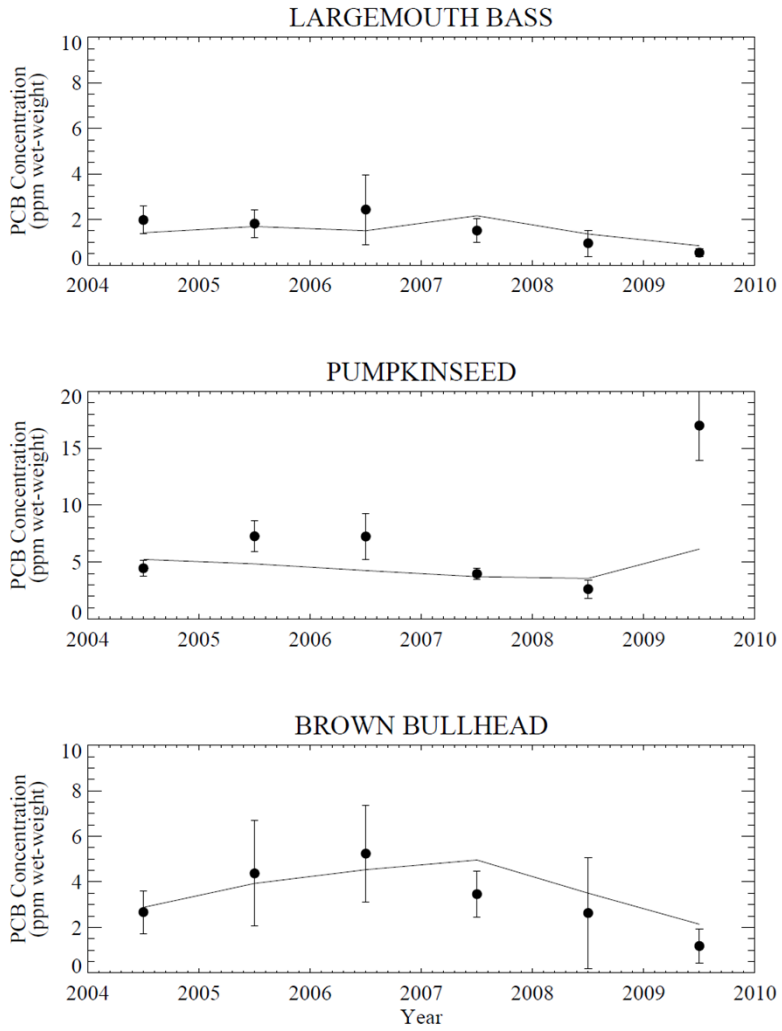




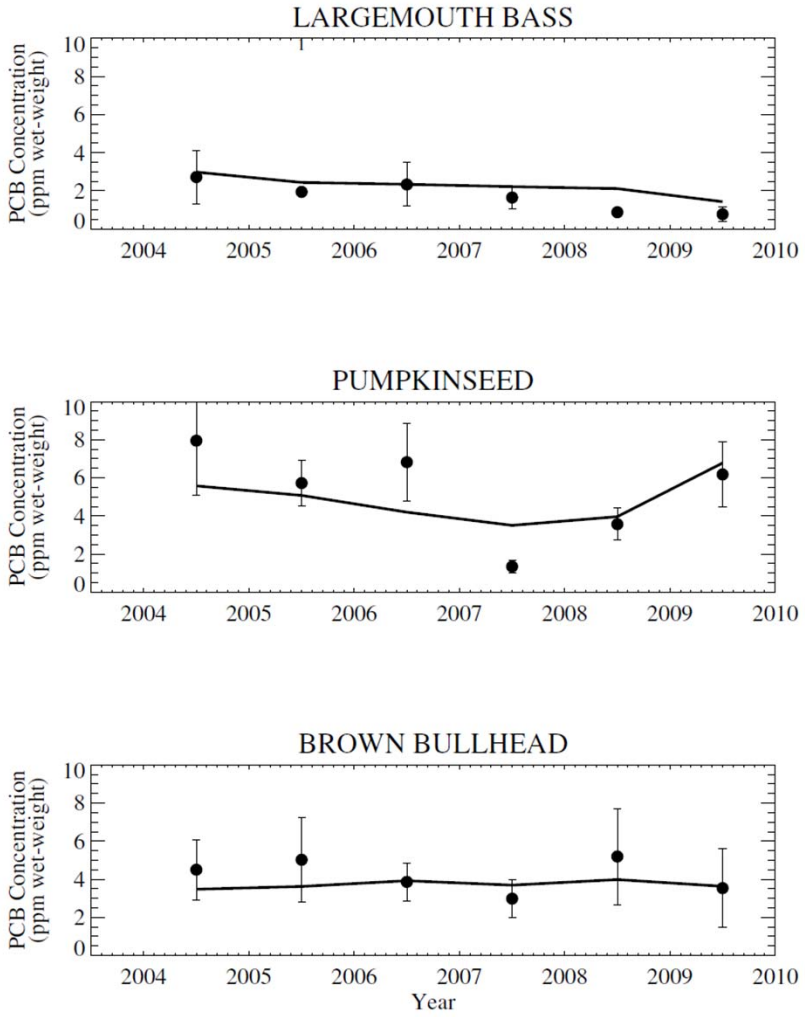
PCB Fate – TI Tri+ Load for FE Flow < 10,000 cfs over July - Sept



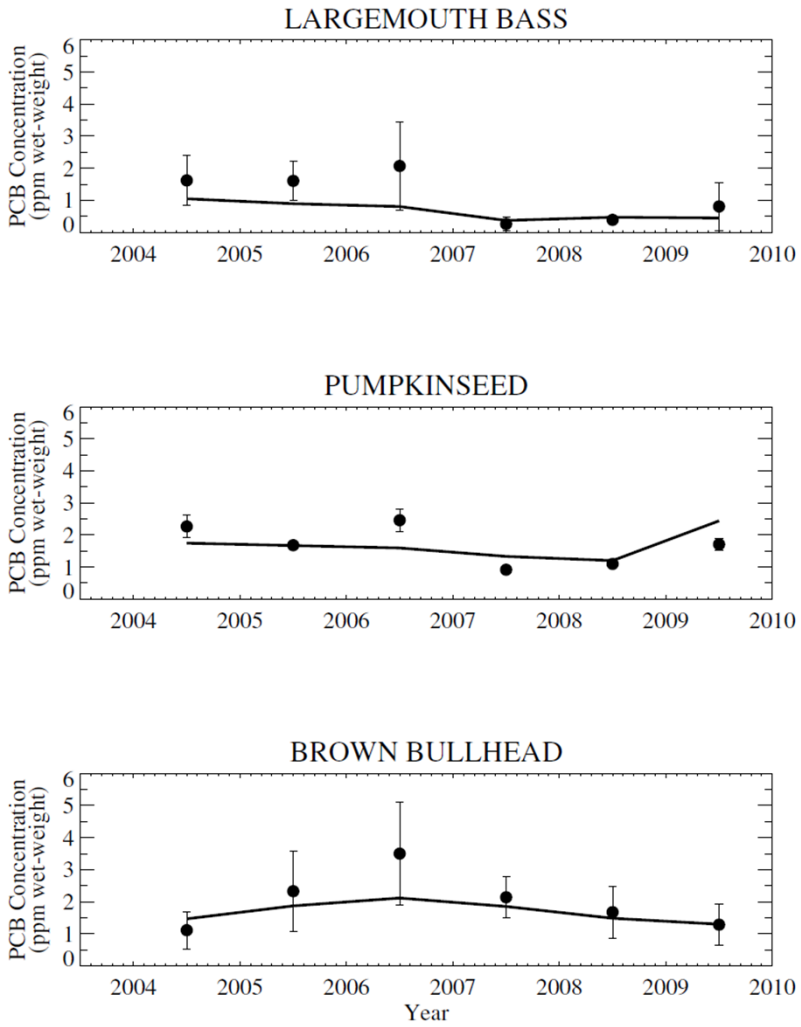
Bioaccumulation Calibration – Thompson Island Pool



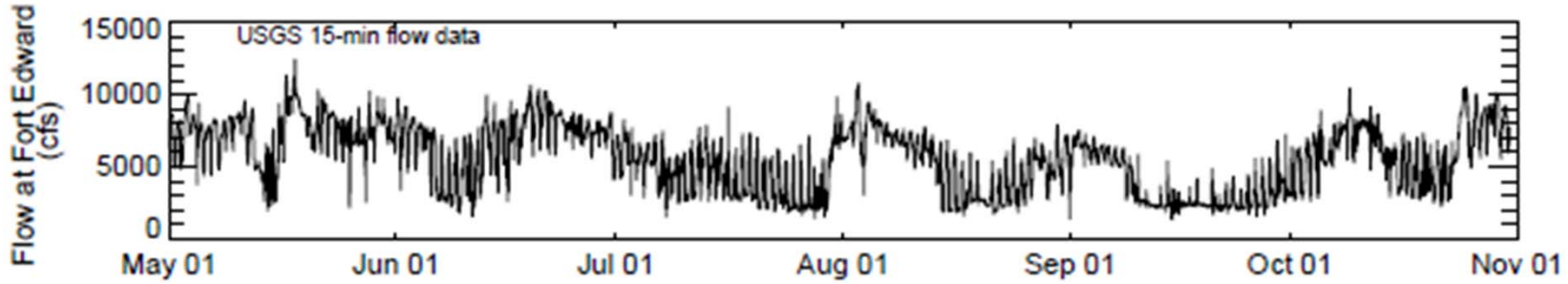
Bioaccumulation Calibration – Reach 6



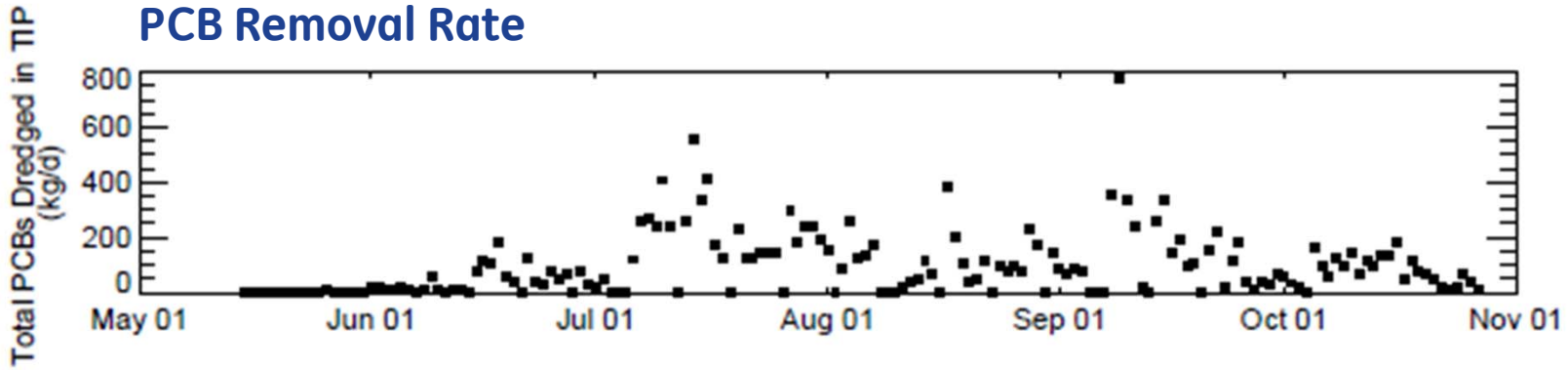
Bioaccumulation Calibration – Stillwater



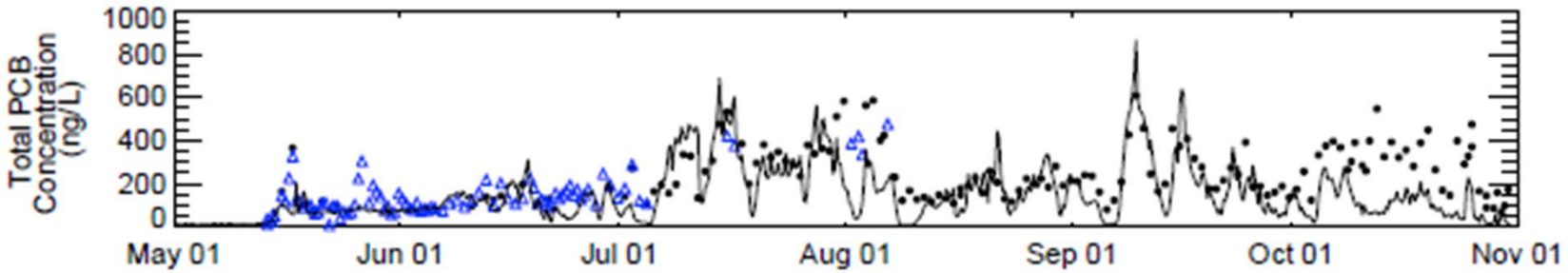
Model Reasonably Replicates Phase 1 Results



PCB Removal Rate



PCB Concentration at Thompson Island



Next Step: EPA Review and Acceptance

- Provided EPA full access to model and its developers
  - Model has been transferred (6/8) to EPA
  - Full documentation report by late-June
  - Meetings being set up to help EPA's team consultants understand how to run the model; EPA will be able to use the model itself
  - Open access to our key technical leads to help EPA's consultants with any issues
- EPA conducts detailed examination & testing of the model
- GE provides level-of-effort needed to satisfy inquiries and testing requested by EPA's modeling contractor

Goal: Complete review/acceptance process by September 1